CHAPTER 1

GENERAL

1-1. Scope. The manual covers tanks subject to Resource Conservation and Recovery Act (RCRA) Subtitle I underground storage tank requirements and is not intended for use in the management of remediation projects for tanks that are believed to have been used to store RCRA Subtitle C hazardous wastes. (Note: There is a regulatory distinction between a tank used to store ignitable fuels and a tank used to store hazardous waste. Subtitle I, not Subtitle C, applies to product tanks, even though hazardous wastes may be generated from the tank upon removal from service. Therefore, generation of hazardous waste from a tank does not preclude the use of this EM.)

Each UST project progresses through an orderly sequence of phases. These phases include initial data gathering, initial field investigations, tank removal, and site remediation. This manual will describe the activities associated with each phase. It is intended to guide qualified technical personnel who prepare UST removal contract documents. It will discuss how to perform the necessary activities. Corps of Engineers Guide Specifications (CEGS) 01351 *Safety, Health, and Emergency Response* (HTRW/UST), 01450 *Chemical Data Quality Control*, 02115 *Underground Storage Tank Removal,* 02120 *Transportation and Disposal of Hazardous Materials* are to be used with this manual. Additional references are included in Appendix A.

1-2. Quality Assurance/Quality Control. This engineering manual will help the designer to incorporate the proper requirements for a quality job into the project documents. This includes incorporating the safety and health requirements of EM 385-1-1 *Safety and Health Requirements Manual*, ER 385-1-92 *Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities* during removal activities. The requirements of ER 1110-1-263 *Chemical Data Quality Management for Hazardous, Toxic and Radioactive Waste Remedial Activities,* EM 200-1-3 *Requirements for the Preparation of Sampling and Analysis Plans,* and EM 200-1-6 *Chemical Quality Assurance* should be followed to assure quality analytical data. It will also aid the USACE's resident engineer in assuring quality construction as required by ER 1180-1-6 *Construction Quality Management* through implementation of the USACE's Quality Assurance and Contractor's Quality Control systems as discussed in EP 415-1-260 *Resident Engineer's Management Guide* and EP 415-1-261 *Quality Assurance Representatives Guide*.

1-3. Closure Requirements. This guidance does not suggest that all of the activities must be performed. Rather the reader must decide what activities are required for each tank closure. This manual addresses the minimum tank closure requirements based on applicable federal regulations and a review of state requirements. In every case, the user of this manual must check the requirements of the local environmental Implementing Agency (IA) and plan for the specific coordination of activities specified in these IA requirements. Questions as to the applicability of federal or state UST removal requirements on active installations or Civil Works Facilities should be addressed to the installation legal office or USACE district office (Civil Works), or if no legal office exists, to the major command legal office to which the installation or Civil Works Facility is assigned. Questions as to the applicability of Federal or state UST removal requirements on former installations should be addressed to the legal office of the USACE district executing the work. A list of state UST contacts is provided in Appendix B to assist in determining these local needs. Tank closure in place must be approved by the appropriate command as detailed below prior to completion:

FUDS	-	Division Commander (DERP/FUDS Manual)
Army	-	Active Installation; MACOM
	-	Civil Works; District Commander/Operations Manager
Air Force	-	MAJCOM/Installation; AFI 32-7044
Other Customers	-	Specific Guidance should be requested.

Figures 1-1 and 1-2 identify the generic steps in the UST removal process and identify the applicable chapters in this manual for each step.

1-4. Definitions and Acronyms.

ACGIH	-	American Conference of Governmental Industrial Hygienists
ACO	-	Administrative Contracting Officer
AFI	-	Air Force Instruction
API	-	American Petroleum Institute
ASTM	-	American Standards of Testing and Materials
AWWA	-	American Water Works Association
B	-	Analyte detected in the method blank
BDL	-	Analyte not detected at the laboratory reporting limit
CFR	-	Code of Federal Regulations
CGI	-	Combustible Gas Indicator
CIH	-	Certified Industrial Hygienist
COLIWASA	-	Composite Liquid Waste Sampler
COR	-	Contracting Officer's Representative

CSP	-	Certified Safety Professional
DERP	-	Defense Environmental Restoration Program
DO	-	Dissolved Oxygen
DOT	-	Department of Transportation
EM	-	Electromagnetic
EPA	-	U.S. Environmental Protection Agency
FID	-	Flame Ionization Detector
FSP	-	Field Sampling Plan
FUDS	-	Formerly Used Defense Sites
GC	-	Gas Chromatography
GPR	-	Ground Penetrating Radar
HTRW CX	-	Hazardous, Toxic, and Radioactive Waste Center of Expertise, located in the Northwest Division, Missouri River Region, Omaha District
IA	-	Implementing Agency
IDLH	-	Immediately Dangerous to Life and Health
IRP	-	Installation Restoration Program
IDW	-	Investigation-Derived Waste
J	-	Analyte detected below the laboratory reporting limit, concentration is estimated
LEL	-	Lower Explosive Limit - the lowest concentration of gas or vapor in air by volume that can be ignited and cause an explosion or flame propagation
MSDS	-	Material Safety Data Sheet
NA	-	Not Analyzed
NFPA	-	National Fire Protection Association
NIOSH	-	National Institute for Occupational Safety & Health
NIST	-	National Institute of Standards Technology
NR	-	Not Reported
ORP	-	Oxidation-Reduction Potential
OSHA	-	Occupational Safety & Health Administration
PEL	-	Permissible Exposure Limit
PID	-	Photoionization Detector
POLs	-	Petroleum, Oils, and Lubricants
POTW	-	Publicly Owned Treatment Works
QA	-	Quality Assurance
QAPP	-	Quality Assurance Project Plan
QC	-	Quality Control
RCRA	-	Resource Conservation and Recovery Act
SAP	-	Sampling and Analysis Plan
SOP	-	Standard Operating Procedure

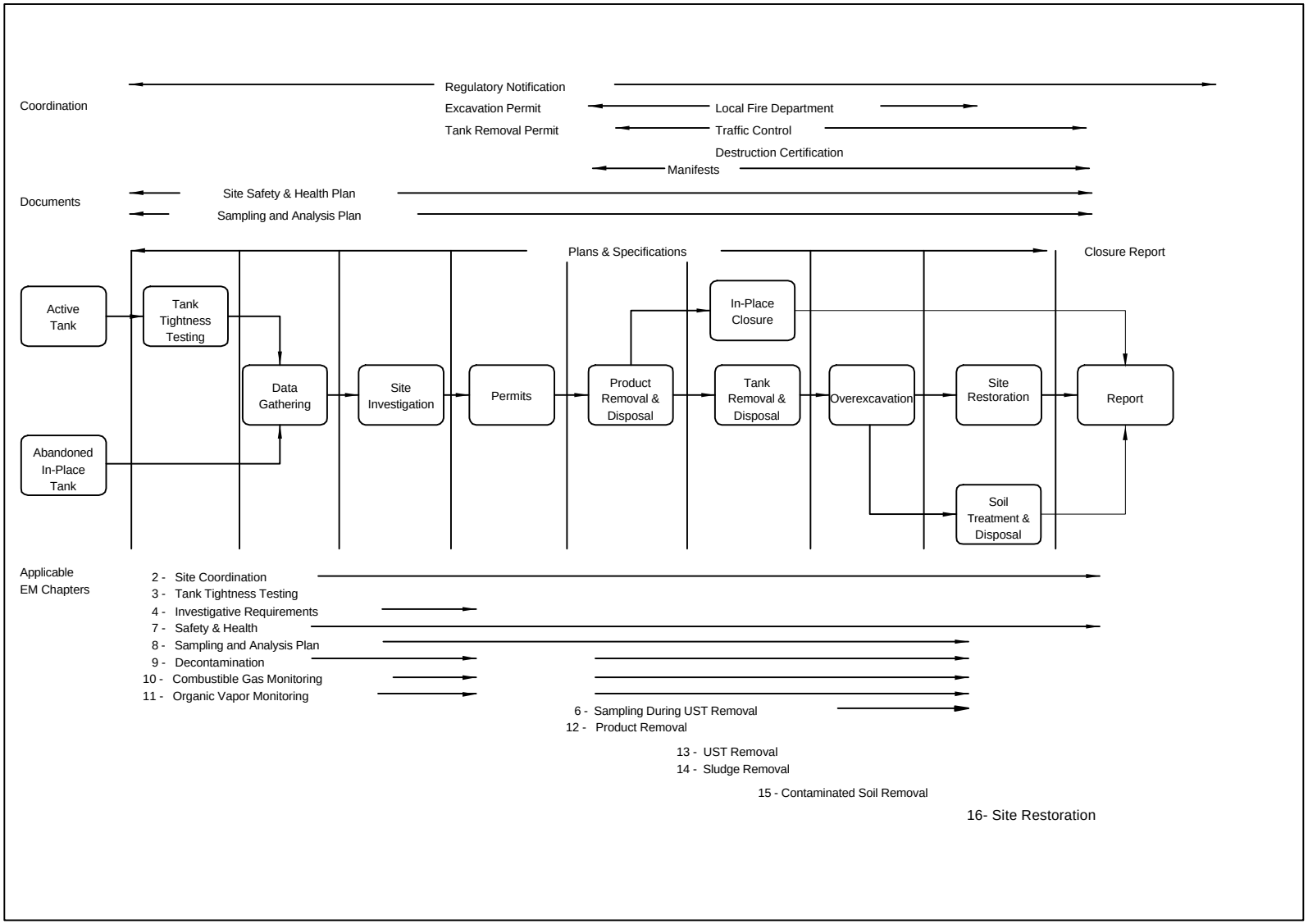

FIGURE 1-1. FLOWCHART FOR CLEAN TANK CLOSURE

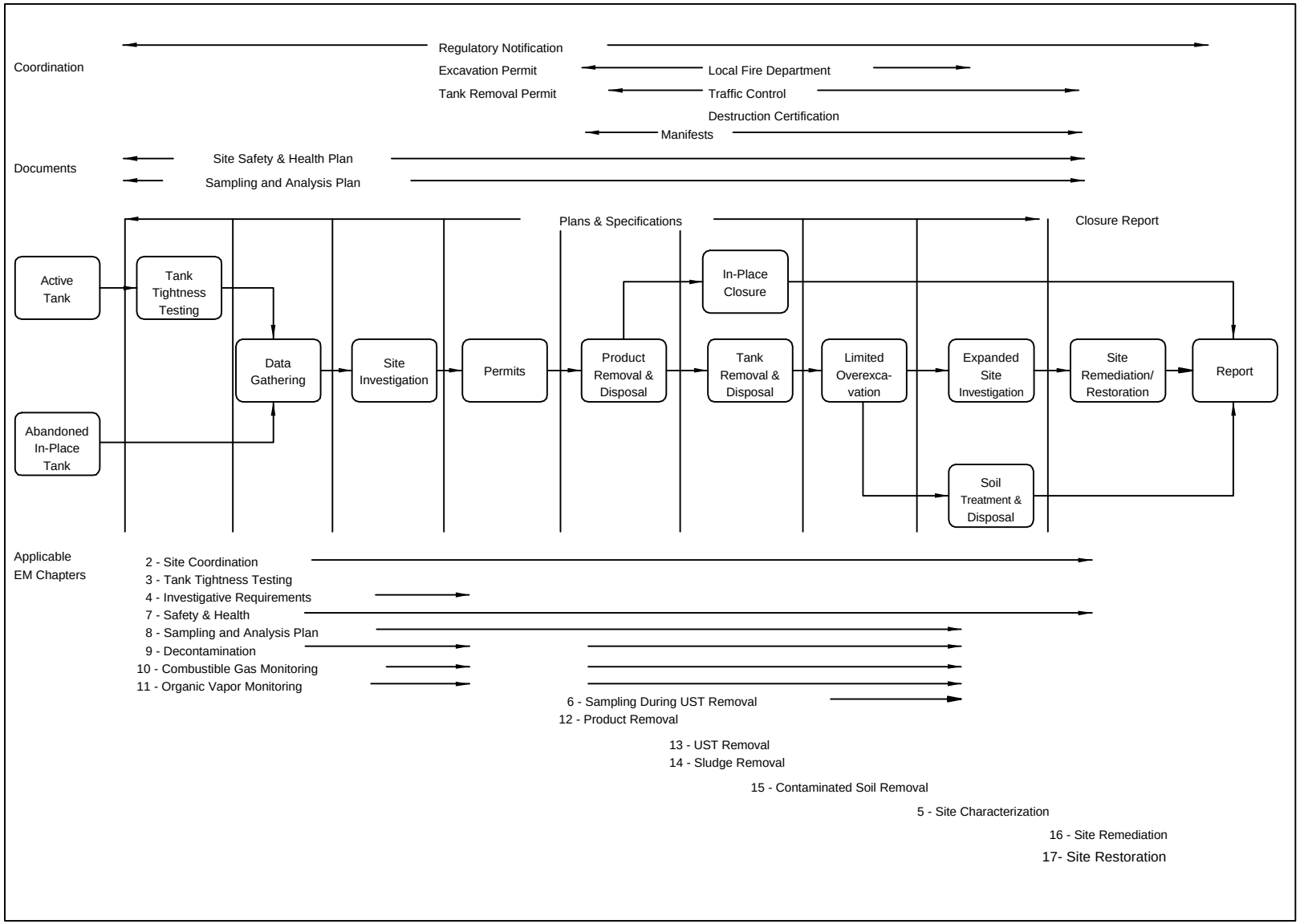

FIGURE 1-2. FLOWCHART FOR TANK CLOSURE REQUIRING REMEDIATION/RESTORATION

SOW - Scope of Work
SSHO - Site Safety and Health Officer
SSHP - Site Safety and Health Plan
TCLP - Toxicity Characteristic Leaching Procedure
TLV - Threshold Limit Value
TRPH - Total Recoverable Petroleum Hydrocarbons
TWA - Time Weighted Average
U - Analyte not detected at the laboratory reporting limit
UEL - Upper Explosive Limit - the concentration of gas in air above which there is insufficient oxygen available to support combustion and explosion is unlikely
USACE - United States Army Corps of Engineers
UST - Underground Storage Tank. This term describes any tank, including underground piping that has at least 10 percent of its volume below grade as defined by 40 CFR Part 280
VOA - Volatile Organic Analysis
VOCs - Volatile Organic Compounds

1-5. Regulations.

a. RCRA Subtitle I. The Hazardous and Solid Waste Amendments of 1984 extended and strengthened the provisions of the Solid Waste Disposal Act as amended by the RCRA of 1976. Subtitle I provides for the development and implementation of a comprehensive regulatory program for USTs containing regulated substances and releases of these substances to the environment.

(1) Subtitle I defines *underground storage tank* as a tank system, including its piping, that has at least 10 percent of its volume underground. This term does not include any:

(a) Farm or residential tank of 1,100 gallons or less used for storing motor fuel for noncommercial purposes.

(b) Tank used for storing heating oil for consumptive use on the premises where stored; however, it is Army policy per AR 200-1, Chapter 4,to manage heating oil tanks 250 gallons (946 liters) or larger similarly to Subtitle I underground storage tanks.

(c) Septic tank.

(d) Pipeline facility regulated under The Natural Gas Pipeline Safety Act of 1968 or The Hazardous Liquid Pipeline Safety Act of 1979 or an intrastate pipeline facility regulated under state laws comparable to these acts.

(e) Surface impoundment, pit, pond, or lagoon.

(f) Storm water or wastewater collection system.

(g) Flow-through process tank.

(h) Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations.

(i) Storage tank situated in an underground area (such as basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

(2) *Regulated substances* include but are not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing such as motor fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

(3) The following UST systems are excluded from the requirements of this part:

(a) Any UST system holding hazardous wastes listed or identified under Subtitle C of the Solid Waste Disposal Act, or a mixture of such hazardous waste and other regulated substances.

(b) Any wastewater treatment tank system that is part of a wastewater treatment facility regulated under Section 402 or 307(b) of the Clean Water Act.

(c) Equipment or machinery that contains regulated substances for operational purposes, e.g., hydraulic lift tanks and electrical equipment tanks.

(d) Any UST system whose capacity is 110 gallons or less.

(e) Any UST system that contains a *de minimis* concentration of regulated substances.

(f) Any emergency spill or overflow containment UST system that is expeditiously emptied after use.

b. RCRA Subtitle C. Subtitle C provides for the handling of hazardous wastes as defined by RCRA. Specifically, a hazardous waste is a waste that meets the following criteria:

(1) It exhibits any of the characteristics of hazardous waste identified in 40 CFR Part 261 Subpart C. These characteristics include:

(a) Ignitability.

(b) Corrosivity.

(c) Reactivity.

(d) Toxicity.

(2) It is listed in Subpart D of 40 CFR Part 261. 40 CFR Part 261 also details exclusions to these criteria and should be consulted for exact definitions.

1-6. Job Qualifications and Training.

a. Training. By the time onsite activities are initiated, all personnel entering into the exclusion area and contamination/reduction zone (including the contractor) must complete the appropriate safety and health training as required by 29 CFR 1926.65(e) and as outlined in Chapter 7 of this manual. The contractor must provide, and have available to the onsite project manager at all times, copies of all certifications described above. This includes documentation of having participated in the most recent refresher course, if required. The contractor must also have available documentation of certification in the UST testing method to be used and in UST removal (if required by the state).

b. Work History. The contractor must provide, and have available to the onsite project manager at all times, work history of all personnel employed by the contractor for the specific purpose of fulfilling the tasks dictated by the subcontract and site-specific plans and instructions. This should be construed to mean any personnel used for purposes of administration or logistical support within the confines of the exclusion/contamination reduction zone as determined by the project manager.

c. UST Removal Experience. In addition, the tank removal contractor must have a minimum of 2 years of tank removal experience and, if applicable, must be trained and certified by the state in which the removal is occurring.

d. Unqualified Personnel. Any personnel deemed unqualified by the onsite project manager should be removed from the site.

1-7. Corrective Action Planning. The guidance in this manual is based on the requirements of federal regulations, AR 200-1 for FUDS and Installation Restoration Program (IRP) sites, and a review of state regulations. The IA may either be the U.S. Environmental Protection Agency (EPA) in states which have not adopted their own UST regulations, or a state agency where regulations have been adopted, or a local agency. The reader is responsible for determining the governing agency for each tank removal. Appendix B lists the state UST agencies.

a. Release Response. A *release* is defined as any spilling, leaking, emitting, discharging, escaping, leaching, or disposing from an UST into groundwater, surface water, or subsurface soils. If there has been a release of petroleum hydrocarbons into the environment, the initial response requirements of 40 CFR 280.61 or the local IA requirements must be followed. The IA must be notified within 24 hours of discovery or within another reasonable time period determined by the IA. Simultaneously, Army Regulation 200-1 also requires the reporting of spills through command channels to the major Army command. After this, the requirements for initial abatement and site check (40 CFR 280.62) must be met including a report within 20 days of discovery or as required by the local IA.

Abatement activities include:

(1) Removal of regulated substances from the UST system to prevent further release.

(2) Visual inspection to prevent further migration to surrounding soils and ground water.

(3) Mitigation of fire and safety hazards posed by vapors or free product

(4) Remedy of hazards posed by excavated or contaminated soils exposed as a result of release confirmation.

(5) Measure for the presence of a release where most likely to be present.

(6) Investigation for free product.

(7) Initiation of free product removal as soon as practicable.

If a release is confirmed, an Initial Site characterization report consistent with 40 CFR 280.63 may be required. Check with the local IA on the need for such a report and the deadline for submittal. You may be required to submit the report within 45 days of release confirmation or another reasonable time period as determined by the IA. The IA will then make a determination of whether a Corrective Action Plan with subsequent Remedial Action is required. This manual does not address spill responses. Information regarding spill response for Army installations is included in AR 200-1. Civil Works guidance on spill response for Civil Works activities is included in ER 200-2-3 and EP 200-2-3. Information concerning spill response notification for Air Force facilities is included in Air Force Instruction (AFI) 32-4002, Hazardous Material Emergency Planning and Response Compliance, and AFI 32-7002, Environmental Information Management System.

b. Tank Closure. Figure 1-1 details the steps that are typically required for a clean tank closure, and Figure 1-2 details the procedures for a closure that requires site remediation. Both figures depict how these steps relate to coordination activities, project documents, and the chapters contained in this manual. Figure 1-3 provides a checklist for tank closure.

UST CLOSURE CHECKLIST	
Date Completed/ & Initials _____	1. Have the major decision-makers been identified? _____ Environmental Coordinator _____ USACE District Office Contracting Representative _____ Implementing Agency Contact
_____	2. Has the tank been identified and located?
_____	3. Is the tank history complete? _____ As-built Drawings _____ Utility Surveys
_____	4. Have the contents been identified?
_____	5. Has a visual site inspection been performed to identify potential construction difficulties and/or signs of leakage?
_____	6. Have the planning documents been prepared and approved? _____ Site Safety & Health Plan _____ Sampling and Analysis Plan _____ Project Work Plan
_____	7. Has an acceptable laboratory been identified and approved?
_____	8. Has a preliminary site investigation been conducted to determine whether site remediation is required?
_____	9. Have all permits been obtained? _____ Excavation _____ Tank Removal (regulatory agency permit)
_____	10. Have provisions been made for product and sludge removal? _____ Recycle of POLs _____ Manifest for Waste Disposal
_____	11. Have provisions been made for disposal of contaminated water? _____ POTW Acceptance of Waters _____ Recycle/Separation/Treatment _____ Manifest Waste Disposal
_____	12. Have the appropriate agencies been notified of exact date of tank removal? _____ Fire Department _____ Implementing Agency _____ Environmental Coordinator
_____	13. Have action levels and screening methods been determined for excavation of soils?
_____	14. Have the methods for soil treatment and/or disposal been identified?
_____	15. Have provisions been made for the tank ? _____Destruction certification _____Recycling
_____	16. Have provisions been made for site restoration?

FIGURE 1-3

1-8. Plan of Work. The tank removal contractor shall develop, implement, maintain, and supervise a comprehensive plan for tank removal and related operations. The work plan should be based on project specification requirements, work experience, the guidance provided in this manual, and the latest versions of the following guidance references: API Recommended Practice 1604, API Publication 2015, API Recommended Practice 2003, API Publication 2217, and API Publication 2219. This work plan will provide the USACE with the contractor's approach to performing the work. No work at the site is permitted to commence until the work plan is approved. At a minimum, the work plan should include:

a. Scheduling and operational sequencing.

b. Discussion of the approach for tank removal, tank cleaning, and tank destruction procedures.

c. A Sampling and Analysis Plan (SAP) that describes sampling procedures and lists analysis parameters, methods, and laboratory or laboratories (as detailed in Chapter 8 of this manual). The SAP should include data quality objectives.

d. Soil sampling locations and rationale for locations.

e. Explanation of how the analytical results will be used.

f. Identification of applicable regulatory requirements and permits including methods to be used to control volatile organic compound (VOC) emissions from decontamination fluids constituting RCRA regulated hazardous waste.

g. Methods to be employed for residue, vapor, liquid, and contaminated water removal; purging; and storage and methods proposed for control of surface water.

h. Identification of waste, tank, and contaminated-soil transporters and means of transportation.

i. Disposal facilities, alternate disposal facilities, and means of disposal or remediation.

j. Borrow source.

k. Spill prevention plan.

l. Spill contingency plan.

m. Decontamination procedures.

n. A statement that the contractor meets the qualification requirements.

1-9. Report Requirements. Typically a report is required by the IA for documentation of tank removal. For each UST site, a Tank Closure Report (Report) must be prepared and submitted. The Report must be prepared by the tank removal contractor and should be submitted within 14 days of site work completion to the COR with copies to the Installation Environmental Coordinator or Civil Works Environmental Compliance Coordinator. Number of copies required (for regulatory agency submittal) must be coordinated with the Environmental Coordinator or Civil Works Environmental Compliance Coordinator and included in the project specifications. The Report must be reviewed by the designers with incorporation of comments by the contractor before the Report is approved as final by the COR. Tank Closure Reports must include the following information as a minimum:

a. A cover letter signed by a Certified Tank Remover certifying that all services involved have been performed in accordance with the requirements outlined in the specifications. The report shall contain the name, address, and phone number of the primary contractor and all subcontractors.

b. A narrative report describing what was encountered at each site, including:

(1) Condition of the UST.

(2) Any visible evidence of leaks or stained soils.

(3) Results of vapor monitoring readings.

(4) Actions taken including quantities of materials treated or removed.

(5) Reasons for selecting sample locations.

(6) Sample locations.

(7) Collection data such as time of collection and method of preservation.

(8) Procedures for backfilling site.

(9) Whether or not groundwater was encountered.

(10) Date of removal or closure.

(11) Capacity and construction of tanks.

c. Notarized statement from the tank cleaning service, certifying the tank is clean.

d. Copies of tank destruction certification, verifying that the tank has been rendered useless.

e. Copies of all analyses performed for disposal.

f. Copies of all waste analyses or waste profile sheets.

g. Copies of all certifications of final waste disposal signed by the responsible disposal facility official. The original of all manifests must be returned to the generator.

h. Information on who sampled, analyzed, transported, and accepted all wastes encountered and copies of manifests.

i. Copies of all analyses performed for verification that underlying soil is not contaminated, with copies of the custody form for each sample. All analyses must give the identification number of the sample used. Sample identification numbers must correspond to those provided on the one-line drawings.

j. Conversation records/correspondence between contractors, subcontractors, and facility personnel or regulators.

k. Scaled one-line drawings referenced to a bench mark or other permanent point showing tank locations, limits of excavation, limits of contamination, underground utilities within 50 feet, sample

locations, sample identification numbers, locations of stockpiled soils, and sample locations with depths.

l. Progress Photographs. The contractor should provide color photographs of four or more different views of the site showing such things as the location of each tank, entrance/exit road, and any other notable site conditions before work begins. After work has been started at the site, the contractor should photographically record activities at each work location daily. Photographs should be 3 by 5 inches and may include:

(1) Soil removal, handling, and sampling.

(2) Unanticipated events such as discovery of additional contaminated areas.

(3) Soil stockpile area.

(4) Tank.

(5) Site- or task-specific employee respiratory and personal protection.

(6) Fill placement and grading.

m. Post-construction Color Photographs. After completion of work at each site, the contractor should photograph a minimum of four different views of the site. Color prints should illustrate the condition and location of work and the state of progress. The photographs should be mounted and enclosed back-to-back in a double-face plastic sleeve punched to fit a standard three-ring binder. Each color print should have a corresponding information box, 1-1/2 by 3-1/2 inches. The box should be typewritten and arranged as follows:

Project No.	Contract No.
Location	
Contractor/Photographer	
Photograph No.	Date/Time:
Description	
Direction of View	